How Big is Santa's Carbon Footprint?

Santa may have one of the biggest carbon footprints of an individual, anywhere in the world, even greater than of Al Gore, that most critics continue to ramble on about, but just how big is Santa's carbon footprint?

Santa in recent years has seen his workload increase as Christmas is seen as holiday by not just Christians but by people of all faiths around the world. Whilst no exact figures are available, and Santa has not published any to date, according to **UNICEF** there are 2.2 billion children in the world. For this we will assume Santa will deliver to all children, since none have made it on to the naughty list this year.

Using UK **National Statistics**, the average household in the UK has 1.8 children, unfortunately we do not have an international average. So Santa would need to visit roughly 1.22 billion homes. Assuming Santa travels east to west, which would be the most logical route thanks to the different time zones and the rotation of the Earth, he has 48 hours to work with. Anders Larsson of the engineering consultancy **Sweco**, estimated that the average people per sq km on Earth is 48, and 20m between each home. Using these figures, Santa would need to travel a total distance of 24.4m km, or 141.46km per second, not including the fact he has stop the sleigh, get out, go down the chimney and deliver the presents, avoiding fires and chimney balloons, that may obstruct his path, then return to the sleigh and continue delivering presents. And visit 7073 homes a second, or 1.4 millisecond per visit.

In terms of Co2 emissions these will be greatly increased by the continued starting and stopping of the sleigh in addition to that with the extraordinary speeds at which the sleigh will be travelling. If we were to consider that the sleigh was being powered by a jet engine as touted in the film "Elf", namely a cringle 3000, whilst no vehicle can travel at that speed we will try to calculate the equivalent jet engine requirements. Before we do this we need to calculate the weight of Santa's sleigh load, all those toys in the sleigh. If each child was given only a Sony PS3 for Christmas, since not even Santa can get hold of Nintendo Wii's, at 7kg each, Santa would be pulling an average load during the journey of 4.3m tonnes. This is of course assuming that people all live evenly around the world with 20m between homes, and of course Santa hasn't died from exertion, or even slowed down, even a little.

Assuming Santa's **sleigh fuel consumption** was similar to that of a 747-400, taking the payload into consideration (9772 times more than a 747), the fuel consumption per km would be 116 000 litres per km. Note we have not taken into account that Santa is carrying the fuel in these assumptions, adding further weight to the sleigh, unless of course he stops off at some mega huge filling station, which he would need to do, or else he would need to carry over 2.8 billion litres of fuel, just for the presents alone, adding to his payload. So Santa now stops off at a filling station each km. To ensure he makes each km, he would need at least 60% extra fuel due to the starting and stopping which would increase his fuel consumption, or 185 600 litres per km.

Since Santa's sleigh is using a 747-400 engine technology, he is using kerosene, which emits 2.58kg of CO2 per litre. Meaning Santa's sleigh emits at least 478t of CO2 per km, or over the entire journey 11.683 billion tonnes of CO2 (42.88% of global CO2 emissions).

Naughty Santa.